

lected by Professor Lilljeborg on the coast of Norway, and about the same number at Stockholm, taken by Professor Lovén on the same coast. In both cases those shells were separated, as distinct from described species, but not named. Reference being made to Mr. Jeffreys, he recognized them, and mentioned my intention of describing the species and naming it after him.

## PROCEEDINGS OF LEARNED SOCIETIES.

### ZOOLOGICAL SOCIETY.

Nov. 10, 1863.—E. W. H. Holdsworth, Esq., F.Z.S., in the Chair.

REMARKS ON THE EXHIBITION OF A NATURAL MUMMY OF *ALCA IMPENNIS*. BY ALFRED NEWTON, M.A., F.L.S., F.Z.S.

For the last twenty-one years, since the appearance of the part of Mr. Yarrell's 'History of British Birds' containing his account of *Alca impennis*, wherein was cited M. Audubon's statement that that species bred on an island in the neighbourhood of Newfoundland, the attention of ornithologists in this country has been more or less directed to that colony, in the hope of obtaining thence specimens of this rare and curious bird. Mr. John Wolley, with his usual sagacity, applying the knowledge he had culled from his extensive researches among the works of our older naturalists, not only soon made out the truth of Willughby's supposition, "*Penguin nautis nostratibus dicta, quæ Goifugel Hoieri esse videtur*" (Ornithologia, Lond. 1676, p. 242), but found that the name was still persistent among those who were yet engaged in the Cod-fishery in the Newfoundland seas. Among his various memoranda I find one, apparently written about the year 1850, to this effect:—

"In Newfoundland, Funk or Penguin Isle is 170 miles north of St. John's, and about thirty-six miles north-east by east from Cape Freels, the north headland of Bonavista Bay. There are also Penguin Isles two or three miles from shore; Penguin Islands, too, in the middle of the south coast of Newfoundland."

This note was evidently written after making a careful examination of the map; and I well remember, in February 1856, going over a chart of the North Atlantic with him, in which he had previously marked the various places known as "Penguin Island," "Bird Rock," and the like. To the best of my recollection, he also told me, either at the same or some former period, that in the course of his reading he had come across various notices of "Penguins," contained in the narratives of ancient voyages to that part of the world. All this time, however, I had not been altogether idle in the way of collecting (or at least seeking for) information on the subject. In the summer of 1853, as I have elsewhere stated\*, a boatman at Torquay, then about seventy years of age, and by name William Stabb, told my

\* 'Zoology of Ancient Europe,' London and Cambridge, 1862, p. 30.

brother Edward and myself that in former days he used to follow the Newfoundland Cod-fishery, and that he had seen Penguins off that coast. He added that they used to resort by hundreds to some islands there to breed, but were destroyed for their feathers, being driven up in a corner by people in boats. This practice, however, must have nearly or altogether ceased in his time; for he stated that he had never seen but two or three birds himself, and never a dead one. I mention these facts merely to show that Mr. Wolley's determination to work out the history of the Gare-Fowl, or Northern Penguin, was formed prior to his acquaintance with Professor Steenstrup's valuable discoveries, and to their publication in the elaborate and excellent article (*Vidensk. Meddelelser*, 1855, pp. 33-116) on this bird to which it always gives me so much pleasure to refer. When Mr. Wolley, later (in 1856), became aware of what that illustrious naturalist had ascertained, he was more than ever bent upon prosecuting his researches; and, acting upon the information I received from him, I at once set about doing what I could to further them\*. Believing at the time that no example of the bird's skeleton existed in any of the European museums, and having great confidence in the trustworthiness of Herr Stuvitz's statements, as given by Professor Steenstrup (*loc. cit.*), that there were still many of its bones to be found on Funk Island, I began to address letters of inquiry respecting them to almost every one I could hear of in Newfoundland who seemed likely to be able to give assistance. I need not here go into details. For a long time I could get no response from any of those to whom I wrote; some of my epistles were returned to me through the dead-letter office; and occasionally I almost despaired of calling attention to the subject in that colony. At last I had the great pleasure of receiving from the clergyman of the Island of Fogo, the Rev. Reginald M. Johnson, a reply which in the most obliging terms promised me his valuable help in the matter. Still the chances of procuring specimens of bones that would really be serviceable towards determining the osteology of *Alca impennis* were not good. Though when Stuvitz, in 1841, visited Funk Island the bones were in quantities (*i Mængde*), many causes during the time that had since elapsed might have scattered or destroyed them. The locality, as I have before shown, was a distant one and, like all resorts of the Gare-Fowl as far as I know them, not easy of access. Stuvitz stated there were but two landing-places, and these only to be attained by a hazardous leap (*kun ved et voveligt Spring*). These latter particulars were confirmed by Mr. Johnson; and in the last letter which I had from that gentleman (only a few weeks ago) he told me he had come to the gallant determination to make the expedition himself, as without him he was sure all endeavours to obtain the bones would fail. Meanwhile the Bishop of Newfoundland, in the course of one of his visitations, had been shown by Mr. Johnson my letters, enclosing sketches of the principal bones and other papers relating to the subject, and most kindly volunteered to give me all the aid in the matter which his high position afforded. When the members of

\* Cf. 'The Ibis,' 1861, p. 397.

this Society know the result, I think they will congratulate me on my good fortune in having excited his lordship's interest. After several other friendly letters, I had three days ago the great pleasure of receiving one in which the Bishop informed me his success had surpassed anything I could have anticipated; for his lordship had done no less than secure me what may be not inaptly called the "mummy" of an *Alca impennis*, which, having come into my hands yesterday, I have now the honour of exhibiting to the Society.

It appears that the Colonial Government have recently conceded to a Mr. Glindon the privilege of removing the soil from Funk Island; for this soil, being highly charged with organic matter, is consequently valuable as manure when imported to Boston and other places in North America. The Bishop, through Mr. N. R. Vail (a gentleman of the United States, well informed on scientific subjects, and therefore aware of the interesting nature of the research), made application to the lessee of Funk Island, who ordered his men employed there to use their best endeavours to obtain for me bones of the Penguin. They appear to have done their work very effectually; for I hear that they "brought away many puncheons of bones and other remains"—of course not all necessarily "Penguins"—which I believe are now on their way to New England, where they will doubtless be readily bought up by the farmers, though I trust some may be rescued from ignoble uses by the American naturalists. This mummy, however, the Bishop tells me, was "found four feet below the surface, and under two feet of ice." I need scarcely point out to the Society what an advantage it is to have obtained so many bones undeniably belonging to one individual bird. Though the skeleton is not perfect, it is plain that we have here at least one side of the entire vertebral column. The extremities of the limbs are altogether wanting on either side; and though this is greatly to be regretted, it is some consolation to think that a knowledge of what these parts are like in *Alca impennis* may be, with a little trouble, supplied from almost every one of the sixty-three or sixty-four stuffed skins at present known to exist\*. I do not, however, mean to prolong these remarks by making any observations on the osteological structure of this bird. That I have reason to hope may be fully described by a far more able pen; for it is my intention to place the specimen I now exhibit in the hands of Professor Owen, trusting that he will make it the subject of one of those monographs which have so materially enriched our series of 'Transactions.' I have but to say in conclusion that, so far as I know, my "mummy" is, with one exception, the only approach to a complete skeleton existing in Europe. That exception is the specimen, nearly perfect, in the

\* Mr. Blyth, just six and twenty years ago, exhibited to this Society some bones which had been left in a preserved skin of this bird (P. Z. S. 1837, p. 122; and Ibis, 1861, p. 396, note). Within the last year, Mr. John Hancock extracted from his own beautiful specimen, and from the very ancient and interesting example in the Newcastle Museum, every bone they contained, without doing the slightest damage to the skins, as might be seen at the late Meeting of the British Association (*Cat. of Exhibition*, nos. 180 & 185).

Osteological Gallery of the Museum of the Jardin des Plantes at Paris; for the remains of the two Gare-Fowls killed on Eldey in 1844, which were sent to Copenhagen, and are still preserved in the Physiological Museum of the University there, have been dissected with a view to show the different systems of organs; they are therefore even less available to determine the general osteology of the bird than are the various loose bones which, through Sturitz's labours, exist in the Museums at Christiania and Copenhagen, that of our Royal College of Surgeons, and in my own collection.

Nov. 24, 1863.—John Gould, Esq., F.R.S., in the Chair.

The Secretary read the following letter from Dr. J. Shortt, F.Z.S., relating to the fishing-propensities of the *Pteropus* of India:—

“SIR,—At about 6 P.M. on the 30th of April last, when at Conleeveram, my attention was attracted to a tank next the Dispensary, which, owing to a light shower of rain that had just fallen, literally seemed alive with small fish gambolling and jumping about in the water. There was nothing new in this; but my attention was drawn to a number of large birds with a somewhat heavy flight, hovering over the water and seizing with their feet the fish, with which they then made off to some tamarind-trees on the bund of the tank, to devour them at their leisure, I suppose.

“On a closer examination, I discovered that what I had imagined mere birds were none other than Flying Foxes, the *Pteropus edulis*. After watching them fishing for some time, I had to leave, owing to the darkness of the evening. I returned to the tank the next evening half an hour earlier, and again witnessed the same occurrence.

“I then got my assistant, Mr. Watson, to bring his gun and shoot some, so that I might satisfy myself as to the identity of these animals. Mr. Watson shot some two or three whilst in the act of seizing their fishy prey, and on examination I found them to be actually Flying Foxes. During a second visit, on the 5th and 6th of June, I observed the same thing occur again.

“I am not aware of the fishing-propensities of this animal ever having been noticed, for I find no account of them in any work on natural history that I have had opportunities of consulting on the subject. This habit of the Flying Fox appearing new to me, I send you this communication, as there may be others who have witnessed the same thing; and if made known, this would, I am sure, prove of interest to the naturalist.

“Chingleput, June 12th, 1863.”

The Secretary also read the following extract from Dr. Bennett's latest letter (dated Sydney, Sept. 19th), respecting the Kagu of New Caledonia (*Rhinochetus jubatus*):—

“My young friend Mr. Ferdinand Joubert thus writes to me from ‘Kai,’ in the interior of New Caledonia, August 2nd, 1863:—

“‘I see in the ‘Sydney Herald’ your article on the Kagu. I will

send you some of the birds as soon as I can procure them, and also some nests and eggs, if pipes and tobacco can induce the natives to bring me some. The Kagus are rather plentiful here, on the side of the "Boh" Mountains, and the natives catch them to eat. Their way of doing this is by making a slipknot on a strong string; and having discovered a place frequented by these birds, they fasten the string in such a way that the birds when running along pass their heads or legs through the noose and are thereby captured. There are two kinds of Kagu, one very different from the other. The largest Kagu you last received from Dr. Segol is a female of the "Bush-Kagu," and, as you have remarked, much handsomer than its fierce friend the smaller Kagu, which is the one with the dark stripes on the wings and tail (and generally of darker plumage). This is the "Grass-Kagu." These two kinds of Kagu do not associate together on good terms; and during the time I had them they were always fighting one with the other, the "Grass-Kagu" invariably getting the worst of the battle.

"I will endeavour to procure a male and female of each species, and send them to you as soon as I can."

"This fighting-propensity may in some degree account for the death of the little pugnacious Grass-Kagu soon after its arrival. It was found in a miserable half-starved condition when dissected; whilst the larger, elegant, and more peaceful 'Bush-Kagu' was in fine plumage, plump, and altogether in a healthy state, which continues to the present day.

"I have since written to Mr. F. Joubert, requesting him to send me as soon as possible a pair of skins of each species, male and female, properly labelled, and living specimens in pairs, as soon after as they can be procured, when I will transmit them to you immediately, so as to decide this interesting doubt on the subject of the existence of two species of this singular bird."

DESCRIPTION OF A NEW SPECIES OF FLEXIBLE CORAL BELONGING TO THE GENUS JUNCCELLA, OBTAINED AT MADEIRA.  
BY JAMES YATE JOHNSON, CORR. MEM. Z.S.

Fam. GORGONIDÆ.

Sect. GORGONELLACEÆ, Val.

JUNCCELLA FLAGELLUM, sp. nov.

Simple, elongated, slender, flexible, slightly twisted on its own axis, and tapering upwards. Bark calcareous, white, smooth, and impuncturate, enveloping a hard grey axis, which has a somewhat polished surface marked with straight striæ. This axis is so highly charged with carbonate of lime that it effervesces in muriatic acid. The coral is quadrangular in section, and has on each of the two narrower sides two series of closely set papillæ, having the eight lobed orifices of polype-cells at their apices. These papillæ are obpyriform or ovate; and in dried specimens they are turned upwards

and adpressed to the stem. Near the base of large specimens the papillæ are in three somewhat irregular rows. The other two sides of the stem are free from papillæ, but there is a slightly elevated line along the middle. The base spreads out to a moderate extent upon the object to which it is attached. The spicula, of which the bark is composed, are tuberculated staves two or three times as long as broad, the tubercles having a tendency to collect at the extremities.

The longest example of this coral which I have seen, measured about 7 feet in length; and it was without its basal portion. The greatest thickness was three eighths of an inch; the largest papillæ were the tenth of an inch in length, and about the same across. In another example, 5 feet in length, the base spread out to the size of a shilling; and the papillæ commenced about 3 inches above this basal expansion. The smallest specimen that has occurred was 31 inches long; and this has been sent to the British Museum. In the collection of that establishment there is a large stone with numerous specimens of this coral upon it, alongside examples of *Callogorgia verticillaris*, Gray (*Primnoa verticillaris*, M.-Edw.). These were brought from St. Michael's, one of the Azores, and presented to the Museum by Mr. McAndrew.

I have ventured to assign this coral to the genus *Juncella*, Val., although a naturalist for whom I entertain the highest respect considers it to be the *Scirpearia mirabilis* of Cuvier. There is, however, so much doubt as to what the coral so named by the illustrious Frenchman really is, that I hesitate to ascribe mine to that species, the more especially as it clearly falls within the definition of the genus *Juncella* (as it appears in the 'Histoire Naturelle des Coralliaires' of Milne-Edwards, vol. i. p. 186), forming a member of the section of *Gorgonellaceæ* which is made up of Gorgoniad corals having a smooth bark and a sublithoid axis containing so much carbonate of lime as to effervesce in muriatic acid. From *Juncella juncea*, Esper, and *J. vimeæ*, Val. (species found at the island of Bourbon), it would seem to be distinguished by the large size of the cup-bearing papillæ; from *J. elongata*, a Mediterranean species, by its being simple, not branched. *J. hystrix*, *J. surculus*, and *J. caliculata* appear to be names without descriptions.

As to the difficulty of identifying *Scirpearia*, the following passage from M. Milne-Edwards's work, already referred to, may be quoted:—

"The Alcyonarian described and figured by Linnæus under the name of *Pennatula mirabilis* seems to be very little connected with *Virgularia mirabilis* as some have suggested. It has a slender stem, attenuated at the two extremities, and bearing at each side a simple series of widely separated polypes. Cuvier formed of it the genus *Scirpearia*, which has been adopted by Ehrenberg. Lamarck placed it in his genus *Funiculina*, near *Pavonaria*, under the name of *F. cylindrica*. Fleming thought that the species was not distinct from *Virgularia*; and Blainville affirmed that it was nothing but a *Gorgonia*. None of these opinions seem to me admissible. It is too imperfectly known to have a place assigned to it in a scientific classification of corals."—*Hist. Nat. Corall.* i. p. 214.

Dec. 8, 1863.—E. W. H. Holdsworth, Esq., F.Z.S., in the Chair.

ON THE SYSTEMATIC POSITION OF THE CRESTED SCREAMER  
(PALAMEDEA CHAVARIA). BY W. K. PARKER.

Many years ago, at a time when the only collection of foreign living creatures seen by me was contained in Wombwell's travelling menagerie, my observations on the structure of birds were necessarily confined, for the most part, to our native species. I am glad of this now, as they are nearly all of *pure* types; and from childhood their life and conversation yielded me a pleasure nearly equal to that derived from communion with bipeds of the plumeless kind.

If the structure of the pure or unmixed types had not been studied by me first in such a way as to make the most definite mind-images, there would have been for me no good firm ground to stand upon whilst contemplating the structure and relationships of such birds as the Trumpeter (*Psophia*), the Cariama (*Dicholophus*), and the *Palamedea*. Any study, however, of the Bird class which should go no further than its own border-line would be fruitful in bringing to light difficulties and even paradoxes: a physiologist might as well study the functions of one class of organs to the total neglect of the rest of the body, the beautiful *whole*. I have for some time past held to the belief that the birds should not be termed a class, as though they formed a group *equal* to that of the Mammalia; I find that Professor Huxley holds the same views.

If that is the case, we have some explanation of the great uniformity of the feathered tribes; for it is a fact that the remotest forms in the group are really not far apart in nature, and the smaller groups are closely intertwined one amongst another.

There are two principal conditions of nearness to the Reptilia in the great Bird group: first the combination of mammalian and of reptilian characters with what is truly ornithic, as in the Ostriches; and the second is when the aberrant characters are only reptilian, and for the most part *lacertian*\*.

Now it is with *lacertian* characters, rather than with what we find in the Crocodile and the Chelonian, that we have to deal in such birds as the *Palamedea* and other mixed forms which are not far from it in actual nature, but are striving, as it were, to attain to the full typicalness of other groups than that to which the *Palamedea* really belongs.

The discovery of such a marvellous creature as Von Meyer's *Archæopteryx* must of necessity give the scientific mind a thirsty longing to know more of the relations, and of the true causes of the relations, of these mid vertebrates, the reptiles and birds,—cold-blooded, scaly, slow, and often loathsome on one hand; on the other warm, intensely active, and endued with the highest locomotive powers, and beautiful beyond the power of words to express.

There are two very beautiful groups of birds, rich in species, with very clearly defined characters, both standing at about the same

\* The skull of every bird known conforms, on the whole, not so much to the *crocodilian* as to the *lacertian* type; their horny jaw-sheaths, large symmetrical sternum, and almost fixed ribs are *chelonian* in their nature.

"ornithic" height above the Ostriches, and in a very similar contiguity to the Lizards: these are the true "Gallinæ" and the true "Anatinæ." In the latter family we have all the birds from the Spur-winged Goose (*Plectropterus*) to the Goosander, inclusive; in the former, the "Phasianinæ" and the "Tetraoninæ"—the typical and subtypical Fowls. The Flamingo is truly *lamellirostral*; but its anatine characters are confused and mixed up with those that are derived from the Ibis and the Crane. Again, in the Fowls, we have carefully to keep the "Cracinæ," the "Hemipodiinæ," the "Megapodiinæ," and the "Pteroclinæ" in separate circles, because the *woof* of their nature is one thing, and the *warp* another; they are not zoologically *pure*, not *wholly* Gallinaceous. The parts first formed in the embryonic skull—those which are most central, and least and most slowly affected by the causes that fit each creature for its place and work in nature—these are strangely alike in both the "Sifters" and the "Scrapers"; and for a long while this fact has been a mystery and almost a paradox to me. I care very little for the webs between the toes; their absence or presence may suffice to separate between *genus* and *genus*, but not between *family* and *family*, still less between *order* and *order*.

The water-birds may, however, be divided very easily into two groups by the presence or absence of two very curious membranous spaces appearing in the occipital plane. These *fontanelles* separate the auditory from the superoccipital cartilage,—and are scarcely open at all in the true "Ardeinæ," the "Rallinæ," the "Podicipinæ," and the "Pelecaninæ"; nor do they appear in the Land and Tree groups of birds.

In the "Ibidinæ," the "Lamellirostres," the Gruine, Pluvialine, and Tringine groups, they are large and persistent; in the "Larinæ" they soon fill up with bone, and so they do in *Ædicnemus*, and apparently in the Bustards. Now the great embryological distinctions between the skull and face of the Geese and Fowls are, first, that in the latter the space between the periotic mass and the superoccipital cartilage is a mere chink, in the latter a persistent oval space; and secondly that the anterior parts of the face, viz. the præmaxillæ, pre-vomers, and dentaries are small and compressed in the Fowls, large and outspread in the sifting birds. The body of the tongue partakes of the general expansion of the face in the Geese; the descending part of the lachrymal suffers from the general contraction of the parts in the face of the Fowl. Moreover the true Fowls ("Phasianinæ" and "Tetraoninæ") have the head of the os quadratum less bifid at its joint with the skull, and therefore nearer the Ostriches and reptiles in its structure than the same bone in the Goose-tribe. It is highly worthy of remark, however, that the Sand-Grouse, *Hemipodii*, Megapodes, and Curassows all agree with the Geese and their allies in having a subornithic condition of this famous bone; and its upper articular crura begin to be quite distinct representatives of the legs of the mammalian "incus." This, be it noticed, makes the four groups of mixed "Gallinæ" correspond, not only with the Lamellirostres, but also with all those puzzling border-birds which



must be studied in connexion; such as *Psophia*, *Parra*, *Cariama*, and *Palamedea*.

Now the Rail-tribe, to which *Palamedea* has been supposed to belong, has been for a long time burdened (on paper) with a very false army-list. Everything alive that has had the misfortune to be possessed of large unwieldy feet has been added to this feeble-minded, cowardly group, until it has become a mixed multitude, with discordant voices, and with manners and customs having no consonance or relation. In a former paper I had the assurance to disband the Cassowaries and Megapodes; in the present I shall permit all birds having much of the nature of the Plover (such as *Parra*), and all those which have in them the nature of a Goose, to depart from the Rail-tribe: I shall retain the *Psophia* as an outpost, notwithstanding that it is more than half a Crane.

A very large number of the genera of birds partake of a structure and nature which may very appropriately be called Passerine; and another very large group, both of genera and families, may also be called Pluvialine,—the common Golden, Grey, and Dotterel Plovers being typical of these groups, which run up through the Sandpipers and Curlews to the Ibises in one direction, through the Lapwing and Stone-Plover to the Bustards and Cranes in another, and through *Chionis* and the Pratincole to the Petrels and Gulls. Still this does not exhaust the pluvialine birds; for the Geese and their allies are related on one hand to the Ibises through the Flamingo, and on the other to the Cranes, although the proper connecting link in this case is doubtful, *Palamedea* lying obliquely, not directly, between them. The Megapodes, Hemipodes, Sand-Grouse, and Tinamous also have no little proportion of the Plover in their nature. The Jacanas (*Parra*) are essentially Plovers, although they have something of the Rail in them, especially in their skull; and they are united to the typical forms by other Spur-winged Plovers (*Pluvianus spinosus*, Gould). Now, looking at the anatine birds as a great division of specialized forms parallel with, and intimately related to, the pluvialine birds, we begin to see how they can be related to the mixed "Gallinacæ," which have so much of the Plover in their essence. But we had much, at starting, in common between the typical and pure Fowls and the Duck and Goose tribe; add to this the fact that the Mound-makers and Curassows come much nearer to the "Anatinæ," and then suppose an anatine bird in which the horny denticles are feeble, but abundant, and the jaws compressed, stout, and trenchant, the same bird having the occipital region in harmony, not with the Geese, but with the Fowls,—put all these things together, and we shall be supposing what really exists in the *Palamedea*. Then we can calmly look at the fact that those Geese which have spurs in their wings, like those of the *Palamedea* (viz. *Chenalopez* and *Plectropterus*), have their legs longer, more grallatorial, and better under them than the typical forms, and that the Spur-winged Goose (*Plectropterus*) has a pelvis exactly intermediate between that of a typical Goose and that of a *Palamedea*. It is worth while to notice the thick down that covers the *Palamedea*, the height of the bare tract on the tibia, and the reti-

culated tarsi, like those of the Goose, and not like those of the Cranes and Rails, which have them scutellate in front. Whilst removing the viscera, I saw that the trachea and inferior larynx were truly anserine; for there are no inferior laryngeal muscles, the contractors of the trachea ending one-third of an inch above the bifurcation, and only a delicate fan-shaped fascia going to the half-rings. Moreover the trachea itself, from being flat and cartilaginous, becomes round and then compressed and osseous an inch above the bronchi, so that it cannot be mistaken for the trachea of any other than an anatine bird. There is nothing whatever in the digestive organs, which are extremely voluminous, to separate the bird from the Geese; yet the gizzard is not so strong as in the types, and the cæca coli are shorter and wider. I have at present only hinted at the osteology of the *Palamedea*. It diverges from the Goose in all this part of its composition, just as much as it converges towards the Curassow and the *Talegalla*; but it is not only more galline than the true Geese (we have seen that both Geese and Fowls have much in common), it is also plainly more *lacertine*. It will require a goodly memoir to do it justice; but in this short notice I must mention one or two things. Its *large soft* tongue, which has not the papillæ horny, has in it the cerato-hyals, ossified from separate points as in the Goose and Hen, much nearer the former than the latter; but the free thyro-hyals are flattened from above downwards, and cannot be mistaken for those of any other but an anserine or anatine bird. All the skull and face, except at the two ends, conform to the lamellirostral type. Point by point, process by process, lamina for lamina, all else is truly and distinctly that which belongs to the Sister, and to no other bird. It may be said indeed that this bird is not a Sister; it is, however, a browser and a *grazer*; and being of Lincolnshire descent, and familiar with the fens, I am well acquainted with the grazing habits of the typical Goose\*. There is a little of the Crane in the sternum; but, on the whole, the skeleton may be said to belong to a very *lacertian* Goose. This is cautiously said; for have we not four fore claws in the wing, extremely long sprawling toes, and the ribs perfectly destitute of the nearly universal tie-bones or appendages? This deficiency is unique amongst birds; and the Crocodiles possess these appendages: I consider this a *lacertian* character, as their occasional presence in Lizards is as exceptional as their absence in birds. Now amongst the rib-like bones in the fossil skeleton of the *Archæopteryx* I see nothing like an appendage starting from any one of them; nor has Professor Owen figured anything of the kind in his beautiful memoir in the 'Philosophical Transactions.' Let it be added that, although several genera of birds have spurs to their wings, these birds all lie nearly on the *same ornithic plane* as the *Palamedea*, — the Syrian Blackbird (*Merula dactyloptera*) (see Professor Owen on *Archæopteryx*, p. 39) being the only exception. The Megapode is also mentioned by Professor Owen (*ibid.*); but that is a great help to me, and comes in well.

\* "—— the cackling goose,  
Close-grazer ——."—*Philips's Cyder*.

So we see that the birds with nails in their wings are (with one or two exceptions) all aquatic types, the more unspecialized forms of which are for the most part possessed of dorsal vertebræ conjoined by a cup-and-ball (opisthocœlian) articulation, and are very far below the typical tree-birds in their structure and in their habits.

But the digit-claws appear in other birds which have not outstanding spurs. Professor Owen (*ibid.* p. 39) mentions the *Apteryx* has having the mid digit terminating in a joint, which supports a curved claw; the Emeu and the Cassowary have the same structure; and the *Rhea* has an ungual phalanx covered with a claw added to the index-finger, which is generally composed of one joint in birds. The Swan, as well as the Chaja (*Palamedea*), have the same, and they both have the mid-finger series complete, the last joint being most perfect in the Swan (*Cygnus olor*). The furculum of the *Palamedea* is more like that of that great pluvialine the Bustard (*Otis tarda*) than that of a Goose; but it is very much more solid: its only counterpart for relative size is that of the *Archæopteryx*. The coracoids are strong bony tubes, open below by a large scooped hollow. The sternum of this bird differs from that of the Goose or Swan by just so much as the sternum of the Short-winged Rails, especially *Brachypteryx*, differs from that of the ordinary types. It is narrower behind, and the episternum is gone from the front: yet it is thoroughly anserine in character, for the keel does not reach the end; and, indeed, it is in this respect intermediate between what we see in the Geese and what occurs in the "Totipalmatæ." Eight ribs reach the sternum by hæmapophyses, as in the Swan; there are seven in the Goose, *Psophia*, and Serass Crane. On the right side there are a pair of floating hæmapophyses (reptilian), and these answer to the fourth and fifth so-called sacral vertebræ. In the Swan these hæmapophyses are better developed, and the penultimate has a long rib reaching it from the sacrum on both sides. And this brings me to say that the sacrum in birds, although actually of great length, has superadded to it a number of dorso-lumbar vertebræ in front, and often several true caudals behind.

Professor Owen (*ibid.* pl. 3. fig. 5) makes the first postfemoral joint in the young Ostrich to be the first true caudal. I cannot agree with him here; for I think that the sacrum in birds is long as a *prolepsis* of that of the mammal, but that it is an exaggeration of the mammalian sacrum. In the *Archæopteryx* there are four vertebræ behind the acetabula before we come to those marked caudal by Professor Owen (*ibid.* pl. 4. fig. 1 c, d). This has led me to run over the birds' pelvis in my own collection and drawings; and the following table, which gives the number of vertebræ, closely embraced and tied together by the extension backwards of the iliac bones behind the acetabula, in different birds, is the result of my observations. I shall remark upon the bearings of these facts afterwards.

## TABLE.

Birds built on the Passerino type.	Corvus frugilegus . . . . .	4	Tetraoninae.	Lagopus scoticus . . . . .	4
	Gymnorhina tibicen . . . . .	4	Hemipodiinae.	Hemipodius varius . . . . .	5
	Turdus merula . . . . .	4	Pteroclinae.	Syrhaptes paradoxus . . . . .	6
	Estrela phaëton . . . . .	3	Megapods.	Talegalla Lathamii . . . . .	5
	Pyrrhula vulgaris . . . . .	4		Crex pratensis . . . . .	3
	Emberiza citrinella . . . . .	4	Rallinae.	Oeydromus australis . . . . .	4
	Linaria chloris . . . . .	4		Gallinula chloropus . . . . .	4
	Pyranga rubra . . . . .	4		Fulica atra . . . . .	5
	Loxia cardinalis . . . . .	4		Botaurus minutus . . . . .	4
	Muscicapa grisola . . . . .	3		Ardea cinerea . . . . .	4
	Budytes Raii . . . . .	4		— purpurea . . . . .	4
	Pratincola rubetra . . . . .	4	Ardeinae.	Herodias garzetta . . . . .	4
	Motacilla Yarrellii . . . . .	4		Nycticorax ardeola . . . . .	4
	Sylvia cinerea . . . . .	4		Tigrisoma leucolophum . . . . .	4
	Phyllopneste trochilus . . . . .	4		Eurypyga helias . . . . .	3
	Parus ater . . . . .	4		Cancroma cochlearia . . . . .	5
	Hirundo urbica . . . . .	4		Baleniceps rex . . . . .	5
	— rustica . . . . .	4		Leptoptilus argala . . . . .	4
	Sitta europaea . . . . .	4	Ibidinae.	Scopus umbretta . . . . .	4
	Lanius collurio . . . . .	4		Threskiornis aethiopicus . . . . .	5
Caprimulginae.	Cypselus apus . . . . .	4	Platalea leucorodia . . . . .	6	
	Podargus humeralis . . . . .	4	Phœnicopterus antiquorum . . . . .	5	
	Caprimulgus europæus . . . . .	3	Palamedea chavaria . . . . .	4	
Alcedinidae.	Alcedo ispida . . . . .	5	Plectropterus gambensis* . . . . .	7	
	Upupa epops . . . . .	4	Anatinae.	Anser palustris . . . . .	9
	Dacelo giganteus . . . . .	4		Cygnus olor . . . . .	11
Trochilidae.	Trochilus colibris . . . . .	3		Dasila caudacuta . . . . .	7
Bucerinae.	Buceros ruficollis . . . . .	6		Anas boschas . . . . .	8
	Cuculus canorus . . . . .	3		Mergus albellus . . . . .	8
	Picus viridis . . . . .	4	Gruinae.	Psophia crepitans . . . . .	4
	Corythaix Buffoni . . . . .	4	Otinae.	Otis tarda . . . . .	5
Zygodactyles.	Rainphastos toco . . . . .	6	Plovers.	Vanellus cristatus . . . . .	4
	Agapornis pullaria . . . . .	4		Charadrius hiaticula . . . . .	3
	Psephotis multicolor . . . . .	4		Hæmatopus ostralegus . . . . .	4
	Psittacus erythacus . . . . .	4	Long-billed Plovers.	Himantopus melanopterus . . . . .	4
	Falco peregrinus . . . . .	3		Nimantopus arquata . . . . .	5
	— aesalon . . . . .	3		Totanus fuscus . . . . .	4
	— tinnunculus . . . . .	3	Snipes.	Scolopax gallinago . . . . .	4
	Accipiter nisus . . . . .	3		— gallinula . . . . .	3
Accipitres diurnae.	Buteo vulgaris . . . . .	3	Jacanas.	Parra jacana . . . . .	4
	Milvus regalis . . . . .	3		Dromaius ater . . . . .	11
	Circus cyaneus . . . . .	3	Ostriches.	Struthio camelus . . . . .	9
	— cineraceus . . . . .	3		Apteryx australis . . . . .	4
	Elanus melanopterus . . . . .	4		Tinamus robustus . . . . .	8
	Aquila chrysaetos . . . . .	5		Glareola torquata . . . . .	4
	Haliaeetus albicilla . . . . .	5	Gulls.	Gavia ridibunda . . . . .	4
	Dicholophus cristatus . . . . .	5		Larus canus . . . . .	4
Vulturinae.	Neophron perenopterus . . . . .	5	Petrels.	Puffinus brevicauda . . . . .	5
	Ulula aluco . . . . .	3		Diomedea exulans . . . . .	5
Accipitres nocturnae.	Strix flammea . . . . .	3	Grebes.	Podiceps rubricollis . . . . .	9
	Asio otus . . . . .	3	Totipalmate.	Phalacrocorax carbo . . . . .	9
	Athene noctua . . . . .	3		Colymbus septentrionalis . . . . .	11
Pigeons.	Columba livia . . . . .	5	Divers.	Orlybia Troile . . . . .	5
	— palumbus . . . . .	5		Alca torda . . . . .	4
Cracinae.	Oreophasis Derbyanus . . . . .	5	Penguins.	Spheniscus demersus . . . . .	4
	Crax globicera . . . . .	5			
Phasianinae.	Dendrotyx . . . . .	6			
	Gallus domesticus . . . . .	5			

\* *Anseranas melanopterus*, a very *Gruine* Goose, has only 6.

This table is large enough for all reasonable purposes ; and its results are very striking, and cannot have had their extreme uniformity caused by chance. If we leave out all those birds which, for swimming and especially diving purposes, have the sacrum extremely long and much anchylosed, such as the Sifters, Grebes, Loons, Cormorants, and also the Ostriches (excluding the *Apteryx*), we shall have four post-acetabular joints as the medium number. A large proportion of all birds have exactly four vertebræ in rear of the thigh-bones ; many have only three, and about as many more have five. As a rule, the small birds of a group have the tendency to drop a joint occasionally ; thus the little *Estrelida* has one less than the other Finches, the Dotterel one less than the other Plovers, and the Crake one less than the other Rails. The medium-sized rapacious birds, both nocturnal and diurnal, have only three. Now, if we consider that all the vertebræ above four in the posterior part of the Duck's pelvis really belong to the tail, then, as I long ago found, the ploughshare-bone is composed of ten segments, as four of the apparently sacral bones are really caudal ; and as there are eight intermediate vertebræ, the large number of twenty-two is obtained—one more than the *Archæopteryx* possesses according to Professor Owen's method of enumeration.

Also in the *Palamedea* two of the anchylosed bones belong to the tail ; there are six free bones, the last having had a rather late addition in the penultimate joint, so that it may be considered as eleven : this gives us nineteen caudal vertebræ for the subject of this paper—only two less than in the *Archæopteryx*. The same method gives us twenty-four for the Swan, sixteen for the Emeu, and twenty-two for the Cormorant.

That five of the so-called sacral vertebræ of the *Palamedea* belong to the dorso-lumbar region is evident, because the first three have hæmapophyses reaching the sternum, and on the right side there are two more sternal ribs in a rudimentary condition. There are seventeen vertebræ fused together, five of which must be supposed removed from the front part and two from behind, thus leaving ten proper sacral vertebræ.

In small birds and in birds of the higher types with short pelves, the number of true sacral vertebræ will be only about seven on an average—a common number among the large herbivorous Mammalia.

As I have only touched upon the points of interest in this skeleton, when I have acquired a fuller knowledge of it and of its congeners, and of the bearings and relations of the feathered tribes generally, I hope to take it up again. Certainly amongst living birds there is not one possessing characters of higher interest ; none that I am acquainted with come nearer, in certain important points, to the Lizard ; and there are parts of its organization which make it very probable that it is one of the nearest living relatives of the marvellous *Archæopteryx*\*

\* The cup-and-ball joints in the dorsal region of many water-birds and of the Parrots must be looked upon as a *general* reptilian character ; so also the single head of the "os quadratum" in the Ostriches. The very simple palatines of the latter birds and of the *Palamedea*, the very long free toes and the simple ribs of the Screamer, all these are more properly *lacertian*.